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ABSTRACT

A study examined the relation between phonemic awareness and reading across the full range of decoding abilities in adults; determined if phonemic awareness can be taught to low-literate adults in one 45-minute session; and determined the effect of phonemic awareness training on the acquisition of decoding skills by low-literate and illiterate adults. Subjects, 41 upper-division and graduate students, 40 students attending developmental reading classes at a community college, and 36 inmates at a pre-release correctional facility, were administered measures of phonemic awareness, word identification, and decoding. For the training component, 19 of the 35 inmates with phonemic awareness scores of 11 or less correct were randomly selected to receive 45 minutes of phonemic awareness training. Results indicated that: (1) there were significant differences among the three groups of subjects for each of three possible comparisons of group means for word recognition, decoding, and phonemic awareness; (2) phonemic awareness scores were significantly and highly correlated with word recognition and decoding skills; and (3) effectiveness of phonemic awareness training and its effect on decoding skills were not statistically significant. Findings provide further evidence that adults who are expert readers have phonemic awareness whereas adult low-literates have little or no phonemic awareness; and that phonemic awareness is not acquired spontaneously and may be difficult to teach to adults. (Fourteen figures of data are included.) (RS)

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The Relationship of Phonemic Awareness to Reading Level and the Effects of Phonemic Awareness Instruction on the Decoding Skills of Adult Disabled Readers

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Phonemic awareness, the ability to examine and manipulate segmented sounds of language, has been found to be strongly related to reading acquisition (Bradley & Bryant, 1983, 1985; Fox & Routh, 1976, 1980; Juel, Griffith, & Gough, 1986; Tunmer & Nesdale, 1985). A number of studies have shown that training in phonemic awareness during or prior to reading instruction results in significantly higher reading achievement among the experimental groups (Bradley & Bryant, 1985; Cunningham, 1986; Lundberg, Frost & Petersen, 1988).

Most research in the area of phonemic awareness and its relation to literacy acquisition has been concerned with the beginning reader. There has been much less investigation into the relationship of phonemic awareness to reading ability in adults. The studies done with adults have all been correlational or causal-comparative and suggest that there is a strong relationship between phonemic awareness and reading ability (Byrne & Ledez, 1983; Morais, Cary, Alegria, & Bertelson, 1979; Pratt & Brady, 1988; Read & Ruyter, 1985). Poor readers and nonreaders appear to be deficient in phonemic awareness whereas good readers demonstrated significantly higher awareness of phonemes in words. Good readers in these studies would be considered good in comparison to the poor readers but not good by most adult standards. None included college level readers.

The purpose of this study was threefold. One purpose was to more fully describe the relation between phonemic awareness and reading across the full range of decoding abilities in adults.

The second was to determine if phonemic awareness can be taught to low-literate adults in one 45 minute lesson. The third purpose was to determine the effect of phonemic awareness training on the acquisition of decoding skills by low-literate and illiterate adults who are receiving daily reading instruction. The evidence from studies on adults can be interpreted in two ways. Low phonemic awareness in adult low-literates has been interpreted as evidence for the idea that phonemic awareness is a consequence of learning to read. Another interpretation is that phonemic

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awareness is a necessary but not sufficient prerequisite for learning to read: that is, the lack of phonemic awareness is causal not consequential. Since training studies with children have provided strong evidence for the causal role of phonemic awareness in literacy acquisition, it was hypothesized that training low-literate adults in phonemic awareness would have a facilitative effect on their acquisition of decoding skills.

Methodology

Subjects

Three subject groups were selected to ensure a full range of reading skills from non-reader to postcollege. Only males were included in this study because one part of the study was done in an all male prison. Of the 117 subjects, 41 were upper-division and graduate students attending a university, 40 were attending developmental reading classes at a community college, and 36 were inmates at a pre-release correctional facility. Students enrolled in the community college reading classes were reading at levels between grades 6 and 12 as measured by the Nelson Denny Reading Test. The prison was selected as a study site because inmates were receiving daily reading instruction in a classroom setting. All 36 inmates who participated in the study were reading below the third grade level as measured by the Test of Adult Basic Education. The reading program being used in the prison was a synthetic phonics program for adults. However, the knowledge of and use of this program varied greatly among the four reading teachers. Amount of reading instruction received also varied from little or no direct instruction to approximately one hour of instruction daily. Most inmates were in general education classes 4 hours daily, 5 days a week. Reading was one of four subjects taught during that time. There were 30 inmates in each class, and their reading levels ranged from nonreader to grade 12.

Procedures

To examine the relation between phonemic awareness and different levels of reading ability, measures of phonemic awareness, word identification (WRAT-R) and decoding (Bryant Diagnostic Test of Basic Decoding Skills) were administered to all 117 subjects. The WRAT-R requires letter naming and reading of one syllable and multisyllabic words. The Bryant test requires subjects to read 50 one to four syllable pseudowords. The phonemic awareness measure was a test of 15 questions measuring phoneme isolation which required the naming of the first or last sound in a word, naming another word that begins or ends with the same sound and deletion of initial, medial and final sounds. One, two and three syllable words were used in this test.

For the training component of the study, 19 of the 35 inmates with phonemic awareness scores of 11 or less correct were randomly selected to

receive 45 minutes of phonemic awareness training immediately following the testing. Training consisted of a brief explanation of phonemic awareness and its relationship to learning to decode. This was followed by activities designed to teach syllable segmentation, alliteration, rhyme, blending, phoneme counting and deletion. An alternate form of the phonemic awareness measure was administered immediately following the training. The untrained subjects control group (N-16) with equally low reading ability and phonemic awareness was given an alternate form of the phonemic awareness measure instead of training. After 12 weeks of reading instruction, the pre-training measures of word identification, decoding, and phonemic awareness were readministered to both groups.

Data Analysis

Two different methods were combined for this study of the relationship between phonemic awareness and decoding skills. The first considers descriptive data which were analyzed with simple regression and Analysis of Variance. The variables were pretest scores on the measures of phonemic awareness, immediate word recognition, WRAT-R, and decoding skill, Bryant test. The second method was training of a subsample of the larger group of subjects who lacked phonemic awareness and decoding skills. Data were analyzed with Analysis of Covariance, with the phonemic awareness pretest score as the covariate.

Results

The results are presented in three parts. The first section presents the descriptive statistics and reports the results of the analyses of variance for the three groups for each of the variables: word recognition, decoding of pseudowords and phonemic awareness. The next section reports the relationship between the three variables. Finally, the results of the ANCOVA for the training component of the study are described.

Descriptive Statistics

As expected, there were significant differences between the three groups of subjects for each of three possible comparisons of group means ($p<.01$) for word recognition, decoding and phonemic awareness. Histograms also clearly show differences between the three groups.

Word Recognition

The histograms in Figures 1-4 display the word recognition scores, as measured by the WRAT-R, first separately for each group and then for all three groups combined. The scores for all 117 subjects ranged from 17 to

89 (ceiling). Approximate reading levels ranged from below third grade to college. The university group's scores ranged from 56 to 89. All university subjects' scores were above twelfth grade reading level except for one outlier (56) which was approximately ninth grade level. The community college group had a wider range of scores with scores ranging from 39 to 74. These scores translate on the WRAT-R to about fifth to above twelfth grade levels. The prison group scored the lowest of the three groups and demonstrated the narrowest range of scores. Their scores ranged from 17 to 33 which indicate below third grade reading level.

There were significant differences between the three groups ($p<.01$) for each of the three possible comparisons of group means. Each group does differ from each of the other two in how well they recognize words on the WRAT-R. The university group scored highest with a mean of 81 , and the community college group scored a mean difference of 23 fewer words. The community college group was able to read words like deny and ethics and missed words like protuberance and prevalence. Finally, the prison group scored a mean difference of 36 words fewer than the community college group and a mean difference of 58 fewer words than the university group. Few inmates were able to read words more difficult than city, tree or himself. The university group was clearly better able to recognize words than either of the other two groups.

Decoding

Figures 4-8 display frequency distributions of scores on the Bryant test for all subjects and for each group. Scores for all subjects ranged from zero to 50 (ceiling). The university group scored between 26 and 50. 26 was an outlier score with the next highest score at 34. The community college group had a similar range of scores; 27-49. The prison group also had a wide range of scores, however, there was no score above 27. Over half of the group scored below 15.

There were also substantial differences between group mean scores on the Bryant ($p<.01$). The university group mean was near ceiling (50) on the Bryant which indicates strong decoding skills, whereas the community college group mean of 37 suggests moderate performance. Specifically, the university group was able to decode CVC, CVCE and multisyllabic pseudowords. For the most part, the community college group was unsuccessful with multisyllabic pseudowords. For example, they were unable to read 2 to 4 syllable pseudowords such as coenuv, uncabeness and sanwixable. This group's relative success with one syllable pseudowords suggests that decoding ability requires more than just mastery of rules especially when reading multisyllabic words. The prison group, with a mean and standard deviation of 7 suggests extremely poor to nonexistent decoding skills. The first 20 items of the Bryant are CVC pseudowords, all composed of only 3 letters. 10 of the 36 subjects scored zero, and 15

scored between 1 and 9. There were huge mean differences between the prison group and the university and community college groups. There was also a significant, but smaller, difference between the university and community college groups. There were clear and significant differences in decoding ability between the three groups.

Phonemic awareness

The histograms in Figures 9-12 display total phonemic awareness scores for each group and for all subjects. Scores for all subjects ranged from 1 to 15 (ceiling). The university group scored between 7 and 15. If the outlier score of 7 is ignored, the range for this group is 10 to 15. Thirty-six of the forty-one subjects scored at or near ceiling (13-15). The community college group had a wider range of scores ranging from 1-15. This group also had an outlier, and the range without this score is 6 to 15. The prison group also had a wide range of scores ranging from zero to 14. However, twenty-three of the thirty-six subjects missed more than half the items for scores of 7 and below.

The university group was near ceiling (15) with a mean of about 14 while the community college demonstrated slightly less awareness of phonemes with a mean difference of about 3 fewer items correct. The prison group demonstrated considerably less phonemic awareness than both groups with a mean of about 7, and they were more likely to miss deletion tasks such as "say phoebe without the first sound". However, they were usually able to isolate the first sound in phoebe.

In summary, the university group was better able to decode pseudowords and recognize real words than either of the other two groups and was near ceiling on the phonemic awareness measure. The community college group was unsuccessful with multisyllabic pseudowords and demonstrated somewhat less awareness of phonemes. The prison group performed considerably below both groups with extremely poor to nonexistent decoding and word recognition skills, they also demonstrated considerably less phonemic awareness than the other two groups.

Relationship between the variables

With regard to decoding ability, there is very little difference between the Bryant measures of decoding of pseudowords and the WRAT-R measures of word recognition. The WRAT-R and the Bryant scores were highly correlated, $r=.938$ ($p<.01$). The WRAT-R and the Bryant share nearly 90 percent of their variance. A scattergram of this relationship indicates that adults who demonstrate high word recognition skills on the WRAT-R will also be able to decode pseudowords on the Bryant. Specifically, they will be able to read multisyllabic words on both scales. By the same token, poor readers on one measure will probably be poor readers on the other

measure. For the most part, they will be able to read only simple CVC words and pseudowords.

In this study, phonemic awareness scores were significantly and highly correlated with word recognition (r-.778, p<.01) and decoding skills (r-.802, p<.01). Scattergrams (Figures 13 & 14) of these relationships show that adults who are expert decoders have high phonemic awareness, whereas adults who are very poor decoders have low or no phonemic awareness. Similar relationships can be observed in scattergrams in studies with children (Tunmer & Nesdale, 1985; Juel, Griffith & Gough, 1986) with one difference. There was one adult who had poor phonemic awareness and was able to decode 26 of 50 pseudowords. It is possible he did not understand the task as he attempted to answer each phonemic awareness question with a rhyme. With this one exception, these data do seem to support the idea that phonemic awareness is necessary, but not sufficient, for decoding. These data also provide further evidence that phonemic awareness does not arise from maturation.

Specific subtasks of the phonemic awareness test were also analyzed for their relationship with reading, and it is interesting to note that the deletion task also correlated highly with word recognition (r-.808, p<.01) and decoding skills (r-.821, p<.01), while isolation and naming another word tasks had only moderate correlations with either word recognition (r-.398, p<.01 & r-.532, p<.01) or decoding of pseudowords (r-.417, p<.01 & r-.587, p<.01). Deletion accounted for about twice as much of the variance as naming another word and about four times as much of the variance as isolation for word recognition and for decoding of pseudowords. This certainly suggests a strong link between deletion and an adults' ability to read both real and pseudowords. This finding is consistent with previous studies with children (Stanovich, Cunningham, & Cramer, 1984; Yopp,1988).

Training

The data for the training component of the study were analyzed using analysis of covariance. ANCOVA was employed to compare the performance of the experimental and control groups on two questions; (1) can phonemic awareness be taught quickly to low-literate adults? and (2) does knowledge of phonemic awareness facilitate decoding skills?

For the first question, results indicated that treatment effects were not significant (F(1,32)-.940, p>1). The experimental group mean was only one point higher than the control group.

An examination of phonemic awareness pretest items reveal most of the subjects in both groups could isolate sounds before training. Observations made during training further reveal that most of the 19 subjects could rhyme and quickly understood blending of sounds to make a word. Although training effects were not statistically significant, during the

instruction which included practice activities, all subjects were able to correctly count phonemes in three phoneme words by the end of training. Nine were able to count four phonemes and two were able to count five.

Observations during training also reveal that deletion was the most difficult form of phonemic awareness to learn especially medial sounds. However, there was some degree of success on all the deletion practice activities. Twelve subjects could delete medial sounds on three to five practice words whereas the other subjects were incorrect on only two or less. All but one subject was able to delete beginning sounds on two to five of the practice words. All subjects were successful to some extent with deletion of final sounds with 16 subjects successful on 3 to 6 words. Apparently, there was not enough deletion practice for transfer to occur.

Although treatment effects of phonemic awareness training were not significant, ANCOVA was used to determine any significant differences between the experimental and control groups on decoding and word recognition skills after 12 weeks of reading instruction. Again, results were not significant. Both groups were similar in decoding, word recognition and phonemic awareness. There was little or no increase in decoding, word recognition or phonemic awareness after 12 weeks. Several factors contributed to these results. There were no significant gains in phonemic awareness immediately after training so it is not surprising that reading and phonemic awareness gains were not significant 12 weeks later. Also, 18 of the 36 inmates were paroled before the end of the 12 weeks. In addition, reading instruction varied considerably. Although all inmates attended reading classes during the 12 weeks, a number of them received little or no direct instruction on how to read.

Conclusions and Implications

These results provide further evidence that adults who are expert readers have phonemic awareness whereas adult low-literates have little or no phonemic awareness. Phonemic awareness increases as word recognition and decoding skills increase. As with studies with children, phonemic awareness is strongly related to reading acquisition. This study did not indicate the direction of that relationship as have a number of training studies done with children. The training component of this study does indicate that further research is needed to ascertain how phonemic awareness should be taught to adults. It may be that adults are resistant to phonemic awareness instruction. They certainly had not acquired it spontaneously or through the reading instruction they had experienced. The evidence from this study seems to support Morais (1979, 1991) and others that phonemic awareness is not acquired spontaneously and may be difficult to teach to adults especially with regard to deletion. Phonemic awareness

instruction to low-literate and illiterate adults may need to include numerous examples and trials especially with deletion. Although the brief training session did attempt to help the adults understand the relationship between phonemes and reading, this was probably not sufficient for a lasting impact. It is likely such connections would be more effective if done in conjunction with reading instruction.

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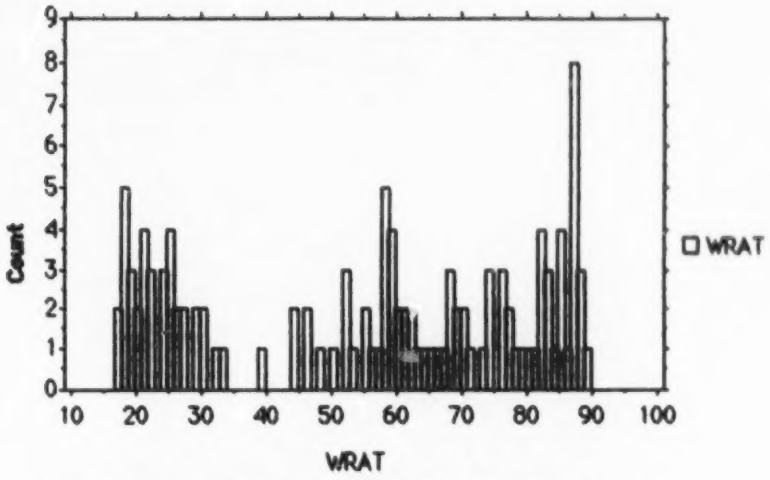

Figure 1 Frequency Distribution of WRAT-R: Combined Groups

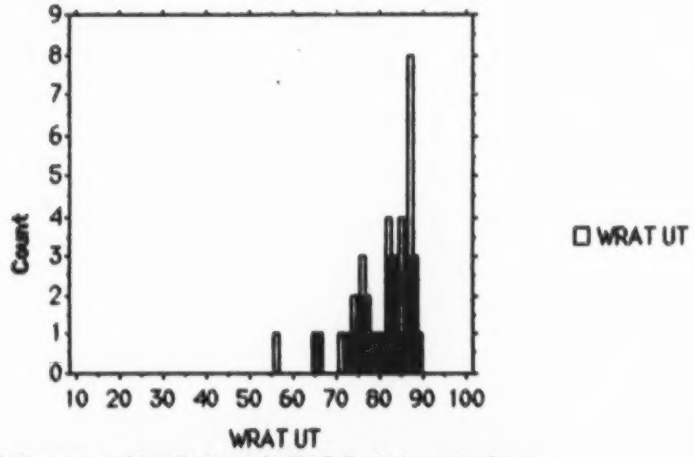

Figure 2 Frequency Distribution of WRAT-R: University Group

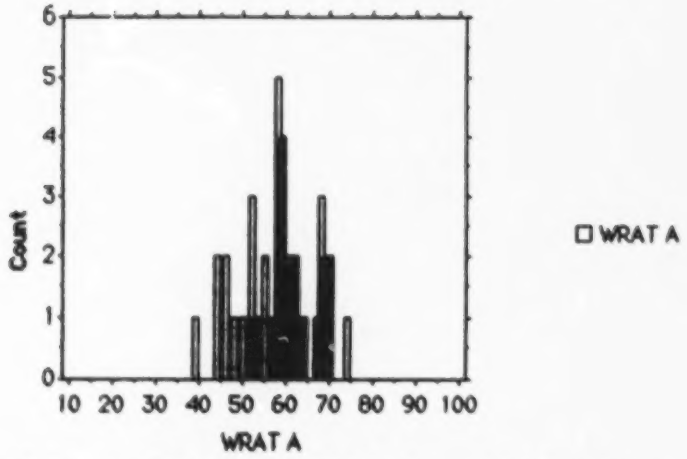

Figure 3 Frequency Distribution of WRAT-R: Community College Group

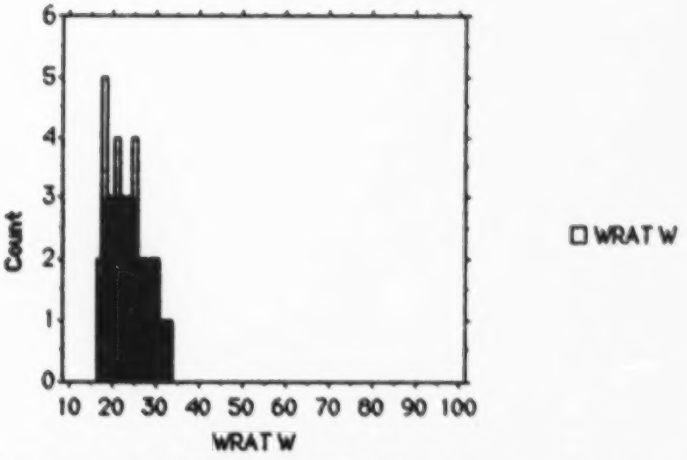

Figure 4 Frequency Distribution of WRAT-R: Prison Group

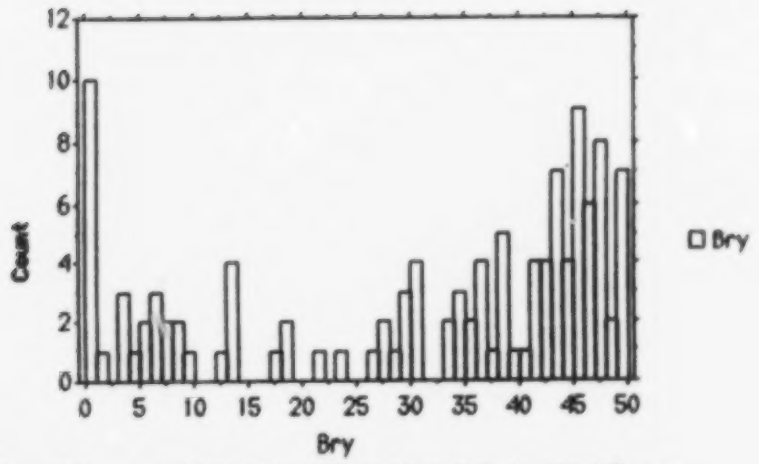

Figure 5 Frequency Distribution of Bryant Decoding: Combined Groups

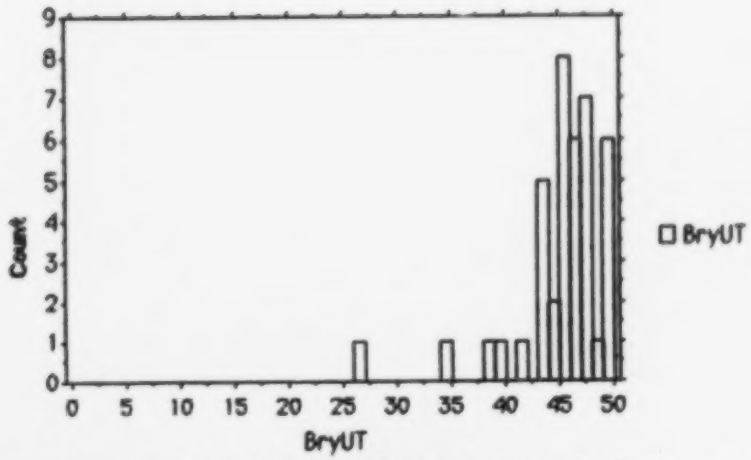

Figure 6 Frequency Distribution of Bryant Decoding: University Group

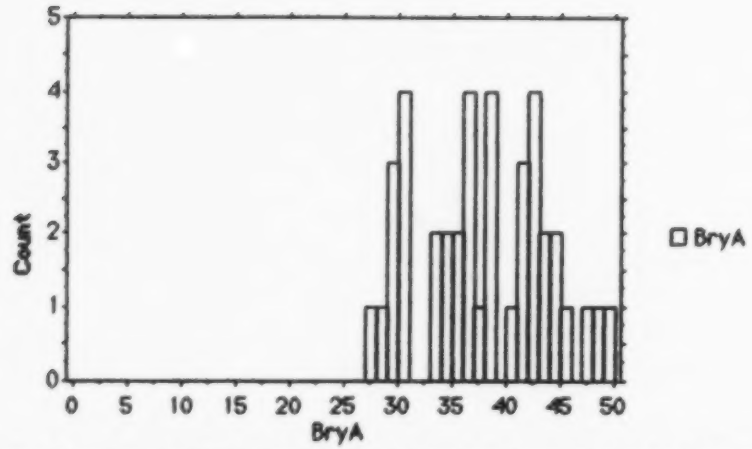

Figure 7 Frequency Distribution of Bryant Decoding: Community College Group

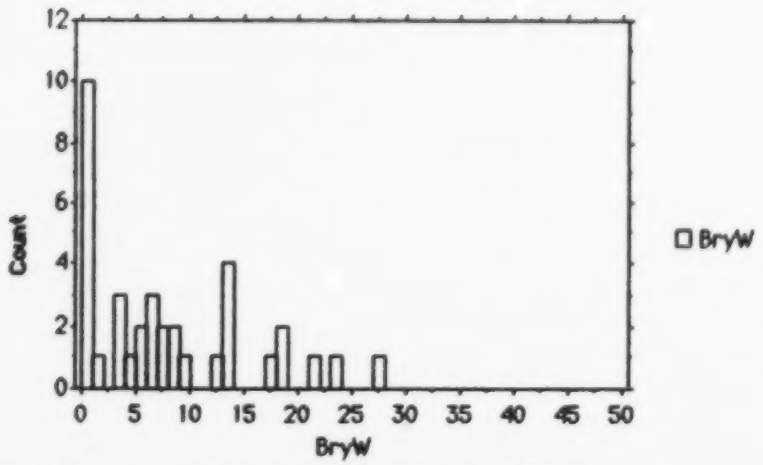

Figure 8 Frequency Distribution of Bryant Decoding: Prison Group

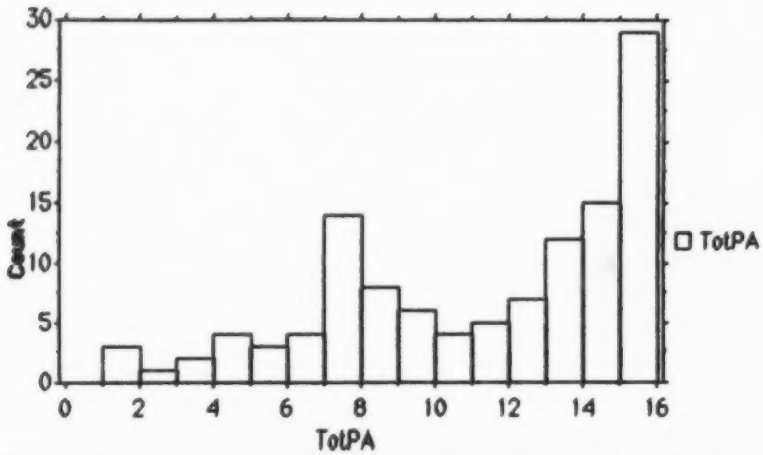

Figure 9 Frequency Distribution of Phonemic Awareness: Combined Groups

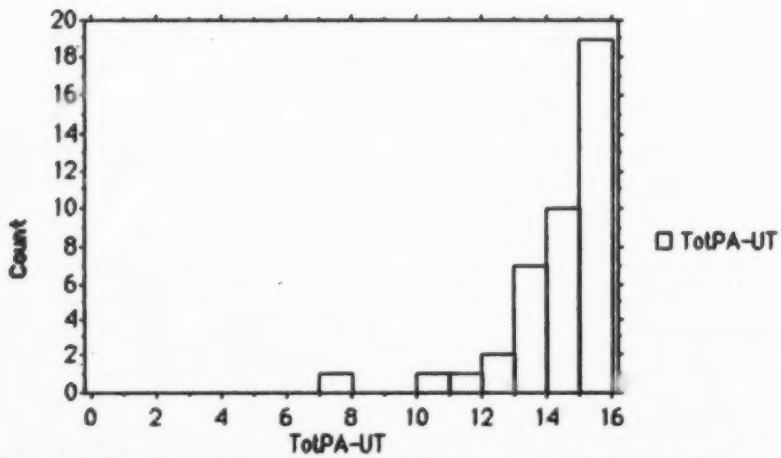

Figure 10 Frequency Distribution of Phonemic Awareness: University Group

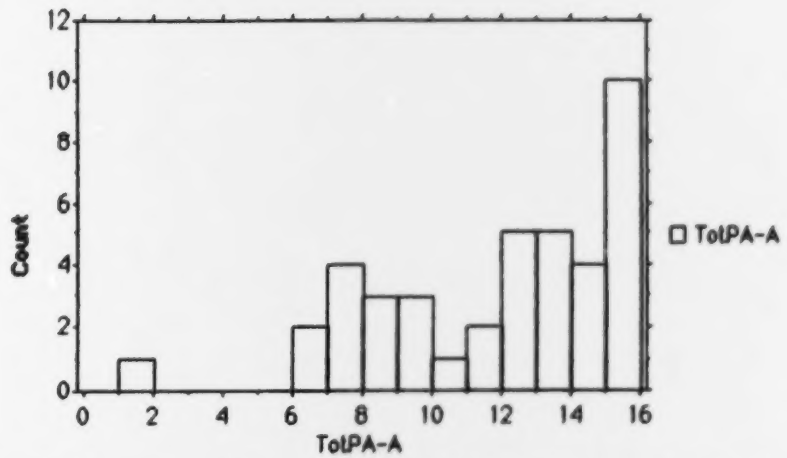

Figure 11 Frequency Distribution of Phonemic Awareness: Community College Group

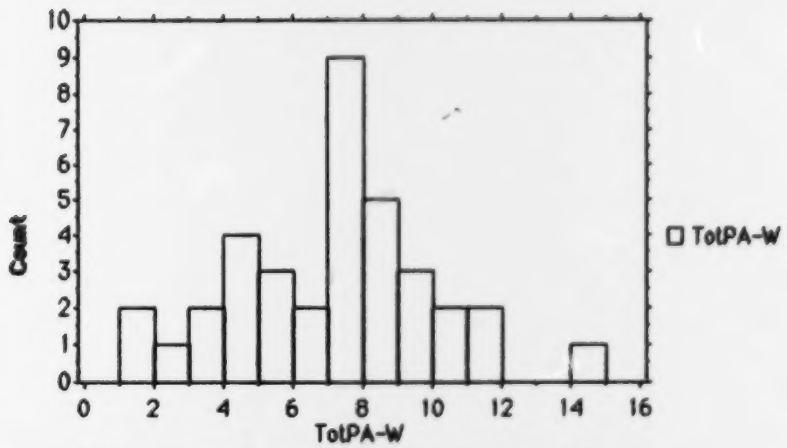

Figure 12 Frequency Distribution of Phonemic Awareness: Prison Group

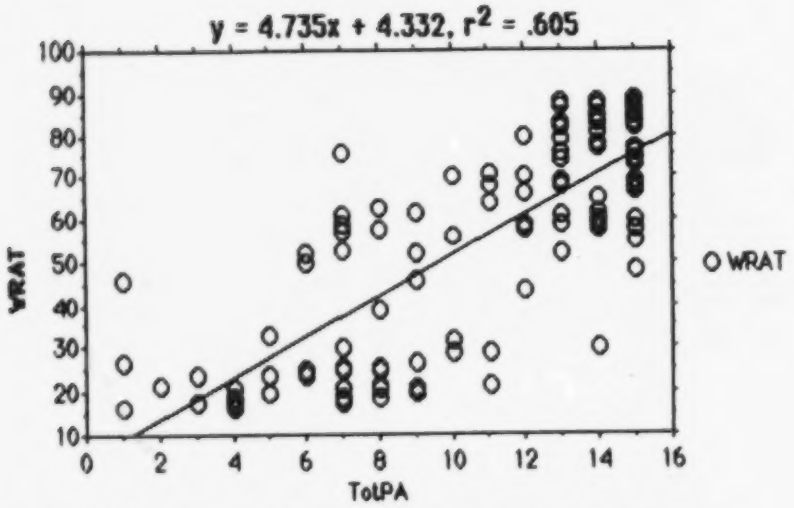

Figure 13 Scattergram of real word decoding and phonemic awareness

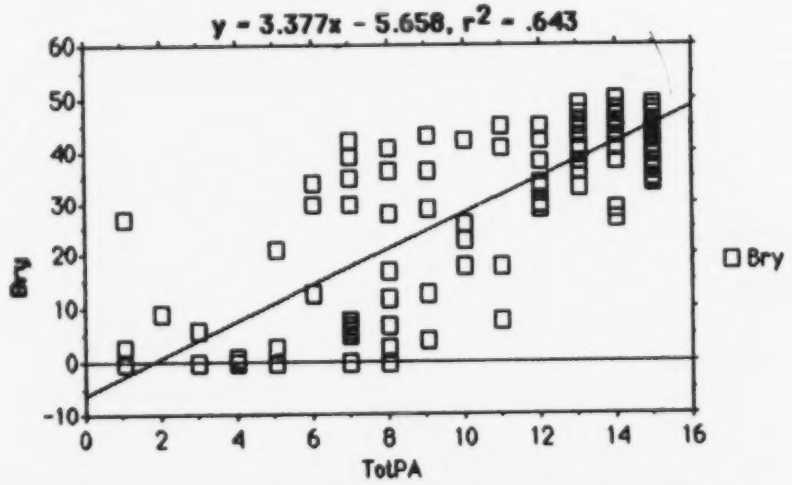

Figure 14 Scattergram of pseudoword decoding and phonemic awareness